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FEDERAL AID IN FISH RESTORATION
1998 Job Performance Report
Program F-71-R-23

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
SALMON REGION (Subprojects I-H, II-H, III-H)

PROJECT I.	SURVEYS AND INVENTORIES
Job a.	Salmon Region Mountain Lakes Investigations
Job b.	Salmon Region Lowland Lakes Investigations
Job c.	Salmon Region Rivers and Streams Investigations
Job d.	Salmon Region Salmon and Steelhead Investigations
PROJECT II.	TECHNICAL GUIDANCE
PROJECT III.	HABITAT MANAGEMENT
PROJECT IV:	POPULATION MANAGEMENT

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1998 ANNUAL PERFORMANCE REPORT

State Of: Idaho | Program: Fisheries Management F-71-R-23

Project I: Surveys and Inventories | Subproject I-H: Salmon Region

Job: a | Title: Mountain Lakes Investigations

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

In August 1998 project staff surveyed five mountain lakes in the Salmon Region. All five lakes are in the Salmon-Challis National Forest. We determined use, fishery status, and natural recruitment potential, and evaluated past stocking strategies.

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OBJECTIVES

1. Evaluate the Salmon Region mountain lake fish stocking program.

2. Collect data on species composition, access, trail conditions, angler/camper use, and spawning habitat for selected Salmon Region mountain lakes.

METHODS

Volunteers used hook-and-line fishing gear to sample fish communities in five mountain lakes.

RESULTS AND DISCUSSION

Volunteers sampled Mystery Lake, Rock Lake #1 and #2, and Cache Creek Lake #2 and #4 to determine use, and fishery status and assess past stocking strategies. Data for of each lake surveyed are documented in tables 1-5.

Table 1. Alpine lake survey data for Mystery Lake #3, 1998.

LAKE LOCATION

Lake name: Mystery Creek Lake #3 Survey date: 8-21-98
IDFG catalog no.: 07-0879 Primary drainage: Middle Fork Salmon
Secondary drainage: Loon Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 2 Township: 13N Range: 14E Elevation (ft) 9070

USE

No. Campsites: 1 No. Firepits: 0 Litter: l ✓ m _____ h _____
Trail around lake: complete _____ partial _____ trampled _____ yes ✓ no
Access: good trail (mi) _____ poor trail (mi) 2.5 cross country (mi) 0.5
Trailhead location: Mystery Creek Off Forest Service Road #172

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: 2 Hours fished: 12 No. Fish caught: 10
Fish/hour: 1 Fish abundance: l _____ m ✓ h _____

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	> 400
C2[a]					3	3	3	1	
TOTAL					3	3	3	1	

[a] C2 = westslope cutthroat trout.

Stocking History

Year	Species	Number of fish	Comments
1987	C2	1,000	Mackay Hatchery
1990	C2	250	Mackay Hatchery
1996	C2	500	Sandpoint Hatchery

COMMENTS

Outlet appears to be suitable for spawning with gravel/cobble size substrate. No inlet other than small snow fed rivulet observed. Limited littoral area in this cirque lake. Maximum depth was 20 m. Westslope cutthroat trout in fair to good condition. Some freshwater shrimp observed; mayflies, caddis and dipterans also present.

Table 2. Alpine lake survey data for Cache Creek Lake #3, 1998.

LAKE LOCATION

Lake name: Cache Creek Lake #2 Survey date: 8-23-98
IDFG catalog no.: 07-0844 Primary drainage: Middle Fork Salmon River
Secondary drainage: Loon Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 27 Township: 17N Range: 15E Elevation (ft):

USE

No. Campsites: 3 No. Firepits: 0 Litter: l ✓ m h
Trail around lake: complete partial ✓ trampled yes ✓ no
Access: good trail (mi) 3.0 poor trail (mi) cross country (mi) 1.0
Trail head location: End of USFS Road #086 (Sleeping Deer Road)

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: 1 Hours fished: 2 No. Fish caught: 4
Fish/hour: 2 Fish abundance: l m ✓ h

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	> 400
C2[a]		1					3		
TOTAL		1					3		

[a] C2 = westslope cutthroat trout.

Stocking History

Year	Species	Number of fish	Comments
1971	C2	1,080	Mackay Hatchery
1974	C2	1,000	Mackay Hatchery
1977	C2	288	Mackay Hatchery
1981	RC[b]	250	Mackay Hatchery

[b] RC = rainbow trout/westslope cutthroat trout hybrid.

COMMENTS

Outlet contains numerous pieces of large organic debris at lake/stream interface. Mainly organic based substrate. Inlet appears suitable for spawning at least during run-off period. Stone fly, caddis, and mayflies collected from inlet. Westslope cutthroat trout in good-excellent condition. Lake mean depth =3.6 m, maximum =4.5 m. Water temp @ 1300 = 16C.

Table 3. Alpine lake survey data for Cache Creek Lake #4, 1998.

LAKE LOCATION

Lake name: Cache Creek. Lake #4 Survey date: 8-23-98
IDFG catalog no.: 07-0845 Primary drainage: Middle Fork Salmon River
Secondary drainage: Loon Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 22 Township: 17N Range: 15E Elevation (ft):

USE

No. Campsites: 2 No. Firepits: 2 Litter: l ✓ m h
Trail around lake: complete partial ✓ trampled ✓ yes no
Access: good trail (mi) 3.0 poor trail (mi) cross country (mi) 0.25
Trail head location: End of USFS Road #086 (Sleeping Deer Road)

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: 3 Hours fished: .75 No. Fish caught: 9
Fish/hour: 12 Fish abundance: l m h ✓

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	> 400
BK[a]			4	3	2				
TOTAL			4	3	2				

[a] BK = brook trout.

Stocking History

Year	Species	Number of fish	Comments
1959	C2[b]	2,000	Ashton Hatchery
1968	C2	2,100	Mackay Hatchery
1971	C2	2,025	Mackay Hatchery
1974	C2	1,000	Mackay Hatchery

[b] C2 = westslope cutthroat trout.

COMMENTS

Outlet has approx. 60 m of usable channel with suitable spawning substrate. Inlet stream of similar size/substrate. Lake has springs as patches of clean substrate are present. Spotted frog adults and larvae observed. Snaky/stunted brook trout only species caught/observed. Lake temp 19C @ 1100.

Table 4. Alpine lake survey data for Rock Lake #1, 1998.

LAKE LOCATION

Lake name: Rock Lake #1 Survey date: 8-22-98
IDFG catalog no.: 07-0863 Primary drainage: Middle Fork Salmon
Secondary drainage: Loon Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 2 Township: 16N Range: 15E Elevation (ft):

USE

No. Campsites: 0 No. Firepits: 0 Litter: l ✓ m h
Trail around lake: complete partial ✓ trampled yes ✓ no
Access: good trail (mi) 0.5 poor trail (mi) cross country (mi) 0.25
Trail head location: End of USFS road #086 (Sleeping Deer Road.)

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: 2 Hours fished: 8 No. Fish caught: 11
Fish/hour: 3.7 Fish abundance: l m ✓ h

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	> 400
C2[a]						3	8		
TOTAL						3	8		

[a] C2 = westslope cutthroat trout.

Stocking History

Year	Species	Number of fish	Comments
1981	RC[b]	250	Mackay Hatchery
1990	C2	500	Mackay Hatchery
1993	C2	500	Sawtooth Hatchery
1996	C2	500	Sandpoint Hatchery

[b] RC = rainbow trout/westslope cutthroat trout hybrid.

COMMENTS

Inlet delivers water from Rock Lake #2 and may provide some spawning area. Outlet contains suitable spawning substrate and extends 100m. Three deep holes along east bank may contain springs and may ensure survival of lake biota during winter months despite relatively shallow depth of the rest of the lake.

Table 5. Alpine lake survey data for Rock Lake #2, 1998.

LAKE LOCATION

Lake name: Rock Lake #2 Survey date: 8-22-98
IDFG catalog no.: 07-0864 Primary drainage: Middle Fork Salmon River
Secondary drainage: Loon Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 2 Township: 16/17N Range: 15E Elevation (ft):

USE

No. Campsites: 1 No. Firepits: 1 Litter: l ✓ m h
Trail around lake: complete ✓ partial trampled yes ✓ no
Access: good trail (mi) 0.50 poor trail (mi) cross country (mi)
Trail head location: End of USFS Road #086 (Sleeping Deer Road)

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: 2 Hours fished: .5 No. Fish caught: 0
Fish/hour: Fish abundance: l ✓ m h

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	> 400
TOTAL									

Stocking History

Year	Species	Number of fish	Comments
1981	RC[a]	2,400	Mackay Hatchery
1988	C2[b]	1,000	Mackay Hatchery
1991	C2	1,000	Mackay Hatchery
1995	K1[c]	1,000	Mackay Hatchery

[a] RC = rainbow trout/westslope cutthroat trout hybrid
[b] C2 = westslope cutthroat trout
[c] K1 = domestic kamloops-strain rainbow trout.

COMMENTS

Lake was fished for 0.5hr. Because no fish were observed, and an abundance of freshwater shrimp (Gammarus) we concluded that no fish inhabit the lake at this time. Lake does not appear to be susceptible to winter kill as many sections appear to be >5m deep. Small outlet stream has limited spawning potential. Spotted frogs and long-toed salamanders observed.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-23

Project I: Surveys and Inventories | Subproject I-H: Salmon Region

Job: b | Title: Lowland Lakes Investigations

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

In November 1998 the Department was notified of a fish kill at Williams Lake, just as the lake was freezing over. We set gill nets for six hours during the day but captured few fish. We will not know the full extent of loss until April when we conduct our spawning ground surveys and egg take operation.

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WILLIAMS LAKE SUMMARY

Williams Lake is located in Lemhi County approximately 12 miles south of Salmon, Idaho at an elevation of 1,600 m. The lake was formed 10,000 years ago when a massive landslide dammed Lake Creek in steep-sided canyon and created a uniform basin. The surface area is 927 ha and has a maximum depth of 56 m. The main inlet to Williams Lake is Lake Creek, with flows supplemented by several small springs and intermittent streams.

No surface outlet exists; Williams Lake is a closed system with a high retention time and a flushing rate of approximately 9 years (Barnes et al., 1994). The steep-sided terrain limits wind-mixing of the surface layers (Barnes et al., 1994). Barnes suggests that Williams Lake does not mix, and that there is relatively little reoxygenation of the oxygen-depleted hypolimnion in the fall and spring. Thus nutrient concentrations continue to rise.

Rainbow trout *Oncorhynchus mykiss* and bull trout *Salvelinus confluentus* are the only known fish species in the lake. In the early 1960s, the Idaho Department of Fish and Game (IDFG) managed Williams Lake as a put-and-take and put-and-grow fishery. In 1984, we discontinued stocking and now manage Williams Lake as a wild trout fishery. Historic information indicates Williams Lake produced 2-3 kg rainbow trout. However, in recent years anglers report fewer large fish caught. Poor water quality, algal blooms and very low dissolved oxygen levels result in reduced salmonid habitat, and may be responsible for the decrease in number and size of fish in the lake.

In recent years anglers have increased pressure on the Department to resume stocking in Williams Lake. To satisfy these vocal anglers and maintain the health and vigor of the locally adapted stock, the Department began a small egg take operation in Lake Creek. Local volunteers collect adults, spawn and maintain incubation trays until fish are released as swim-up fry. Approximately 20,000 eggs were incubated in 1997 and 1998 and all the fry were released in the lake.

In November 1998 as the lake was freezing over, local homeowners reported dead fish along the shore line. We were unable to ascertain the numbers killed as the lake was nearly covered in ice.

Project staff set several experimental gillnets for six hours during daylight and captured only four rainbow trout. We counted 52 dead trout along the shore near the inlet. We will not know the extent of the loss until April 1999 when we conduct our spawning ground surveys and egg take operation in Lake Creek.

We speculate that the lake experienced a rare phenomenon in which winds from a certain direction and for an extended period of time caused Williams Lake to turn over. Mixing nutrient rich, anoxic waters from the hypolimnion with surface layers would have reduced oxygen to lethal levels for salmonids (<5 mg/l).

Department personnel measured oxygen profiles at nine sites on Williams Lake in January 1999 (Table 1). A map with site descriptions is on file at the IDFG Salmon

Table 1. Williams Lake dissolved oxygen and temperature data for January 29, 1999.

Depth (m)	Site 1		Site 2		Site 3		Site 4		Site 5		Site 6		Site 7		Site 8		Site 9	
	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l	Temp (°C)	O_2 mg/l
0	2	4.8	2	5	1	7.5	1	6.6	1	8	1	9.8	1	11	1	5.8	1	11
1	3	4	3	3.2	3	4.2	2.5	4.4	2	7.2	2	9	2	10.6	2	4.1	2	10
2	4	2.2	3.5	1.8	3.7	1.8	3	2.5	3	4.2	3.2	4.4	3	6.5	3	2.8	3	6
3	4	1.5	4	1.2	4	1.5	4	1.8	4	2.2	4	2.2	4	2.8	3.8	2	3.8	2.8
4	4	1.2	4	1	4	1.3	4	1.5	4	1.8	4	1.8	4	1.8	4	1.5	4	1.8
5	4	1.2	4	1	4	1.2	4	1.3	4	1.5	4	1.2	4	1.5	4	1.2	4	1.4
6	4	1	4	1	4	1.2			4	1.4	4	1.2	4	1.4			4	1.2
7	4	1			4	1.2			4	1.2			4	1.3			4	1.2

Region office. We found dissolved oxygen concentrations of 5 mg/l or greater were found only near the inlet of the lake and near the lake surface.

Barnes (1994) describes Williams Lake as eutrophic. In addition to severe oxygen depletion in the hypolimnion, phosphorus concentrations are elevated and algal growth is excessive. High nutrient levels in Williams Lake are a result of internal loading (primary release of phosphorus from the lake sediments when oxygen is low). Barnes determined contributions to the to the overall nutrient load included stream flows (7%), septic sources (5%), overland flow (2%); and internal sources (86%).

Land use practices such as leaking septic fields contribute to the lake's high productivity and associated water quality problems. These should be controlled, but internal loading of nutrients from the hypolimnion is the primary factor affecting Williams Lake productivity.

The IDFG and local landowners have examined two alternatives to correct water quality problems in Williams Lake. The first is to install a pump that injects air into the lake at 18 m. Directional fans would mix the surface waters and create current. This system could provide oxygen directly to oxygen poor waters, increase available fish habitat, prevent complete ice cover in the winter, and diminish the amount of phosphorus loading from internal sources. The project had a price tag of 0.6 to 1.4 million dollars in 1994.

The second possibility was hypolimnetic withdrawal. A 15 to 20 cm diameter siphon tube would pull water from the hypolimnion and discharge it at the base of the landslide/dam. Initial cost estimates range from $50,000 to $100,000.

Both corrective measures are extremely expensive and may prove to be cost prohibitive. If the public supports either one, we will search for grant monies to implement one of these control measures.

LITERATURE CITED

Barnes, C. et al. 1994. Williams Lake Restoration Study, KCM Inc., Seattle, Washington.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fishery Management F-71-R-23

Project I:
Surveys and Inventories

Subproject I-H: Salmon Region

Job: c

Title: Rivers and Streams Investigations
Wild Trout Population Surveys

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

During summer 1998, we surveyed the Salmon River between Salmon and Clayton, Idaho to assess fish populations. Mountain whitefish *Prosopium williamsoni* was the predominant species found in four electrofishing sites combined (58%). Rainbow trout *Oncorhynchus mykiss*, wild and hatchery combined, were rare (2%). Sucker *Catastomus sp.* (23%), dace *Rhinichthys sp.* (3%), juvenile chinook salmon *O. Tshawytscha* (3%), squawfish *Ptychocheilus oregonensis* (4%), sculpin *Cottus sp.* and chiselmouth *Acrocheilus alutaceus* were also present. Non-game species comprised 40% of the total electrofishing catch.

Introduced brook trout *Salvelinus fontinalis* have contributed to the decline of westslope cutthroat trout *O. clarki lewisi* in Valley Creek. To reestablish a fishable population of westslope cutthroat trout, we removed 4,503 brook trout by multiple-pass electrofishing and transplanted 422 westslope cutthroat trout and 336 bull trout into Valley Creek from several area streams.

Project personnel conducted rainbow trout spawning ground surveys in the upper Lemhi River to monitor the effects of regulation changes and habitat improvement projects. We noted a substantial increase in redd sites in 1998 compared to previous years.

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OBJECTIVES

1. Determine species composition and relative abundance of the fishery in the Salmon River between Salmon and Clayton, Idaho.

2. Determine the effectiveness of multiple pass electrofishing in reducing brook trout *Salvelinus fontinalis* abundance in Valley Creek.

3. Reestablish westslope cutthroat trout *Oncorhynchus clarki lewisi* in Valley Creek.

4. Monitor resident rainbow trout *O. mykiss* spawning ground escapement in the upper Lemhi River to evaluate the benefits of harvest restrictions and habitat improvement efforts.

STUDY AREA AND METHODS

Salmon River

During July and August 1998 we electrofished four transects in the Salmon River to determine fishery composition and relative abundance. The uppermost site, the Tunnel Rock transect, was centered around the BLM access site (river kilometer (rkm) 548.7 to 550.3). The Penal Gulch site began at the Penal Gulch boat ramp (approximately 6.4 km downstream of Challis, Idaho) and extended upstream 1.6 kilometers (rkm 513.3 to 514.9). The Ellis transect began at Deer Gulch boat ramp and extended upstream 0.8 km above the confluence of the Pahsimeroi River (rkm 488.3 to 489.9). The Salmon site started at the Aldous Ranch extending upstream to the mouth of the Lemhi River (rkm 413.5-415.6).

Project personnel used pulsed direct-current electrofishing equipment (Coffelt VVP-15 powered by a 5,000-watt Honda generator) mounted in an 18-foot welded aluminum jet boat. We attempted to capture all sizes of game and nongame fish. We electrofished while drifting slowly downstream under power using approximately 300 volts and 5 amps of pulsed DC. All fish were identified and measured to the nearest millimeter.

Valley Creek

We concentrated efforts to remove brook trout on upper Valley Creek, beginning 9.6 km (6 mi) above its confluence with the Salmon River and working 13.9 km (13 mi) upstream.

To monitor movement of fish transplanted into Valley Creek, project staff surgically implanted radio transmitters into 20 westslope cutthroat trout between July 17 and July 30, 1998. Westslope cutthroat trout receiving transmitters ranged in size from 294 to

389 mm; weights ranged from 200 to 594 g. All implanted trout were captured at Dagger Falls (Middle Fork Salmon River) and transported to Valley Creek.

Upper Lemhi River

In 1994 the Idaho Department of Fish and Game began redd counts on Big Springs Creek, a tributary to the Lemhi River near Leadore, Idaho. By 1997 we established three transect areas to monitor long term trends in the population; two transects on Big Springs Creek and one on the Lemhi River. The two sites on Big Springs Creek include all of the creek on the Karl Tyler and the Darwin Neibaur ranches. The Lemhi River site includes the river within the Merrill Beyeler Ranch from the fence line 100 meters upstream of the upper water gap to the lower fenced boundary.

We conduct redd counts annually between April 21 and May 3. Most spawning has ceased by the third week of April, therefore, the counts should represent the total spawning activity for the year.

RESULTS AND DISCUSSION

Salmon River

Survey sites, sampling dates, and species captured are listed in Table 1. We captured 1,096 fish, 58% of which were mountain whitefish *Prosopium williamsoni*. At individual sites, mountain whitefish were 30 to 75% of the catch.

Suckers, mainly largescale *suckers Catostomus macrocheilus* with a small number of bridgelip suckers *C. columbianus,* comprised 23% of the combined 4-site sample. Rainbow/steelhead trout and juvenile chinook salmon *O. tshawytscha* were captured in low numbers at all 4 sites.

Generally, the salmonid species numbers increased as we moved upstream while non-game species were more abundant in the lower sites.

Valley Creek

During September and October 1998, electrofishing crews removed 4,503 brook trout from 11.2 km of Valley Creek. As we moved upstream into the higher gradient headwaters, we found westslope cutthroat trout with increasing frequency. Electrofishing was especially effective in October when pairs of spawning brook trout were removed from their redds and the redds destroyed.

Table 1. Fish species composition of Salmon River transects surveyed July and August 1998.

	Transect			
	Penal Gulch	Salmon	Ellis	Tunnel Rock
Survey date	8-3	7-28	8-6	8-10
Water temperature (°C)	19			16
Total fish captured	205	448	254	189
Relative abundance (%)				
Whitefish	30	51	72	76
Rainbow/steelhead trout	2	2	4	1
Chinook salmon	1	2	3	5
Sucker	53	16	17	13
Chiselmouth	8	6	0	0
Squawfish	<1	8	<1	0
Shiner	4	10	<1	0
Other*	1	5	2	5

* Northern pike minnow (*Ptychocheilus oregonensis*), dace (*Rhinichthys sp*), and sculpin (*Cottus sp*).

Crews transplanted 422 westslope cutthroat trout and 336 bull trout *S. confluentus* from nearby tributaries to repopulate Valley Creek with native stocks (Table 2).

Between June 17 and June 30, 1998 we implanted radio transmitters in 20 westslope cutthroat trout to monitor their movements. Because of budget constraints we had to use previously-used radio transmitters. Trackers never received signals from six of the implanted transmitters after the fish were released. Most likely, defective transmitters or nearly exhausted batteries caused these failures.

Table 2. Westslope cutthroat trout and bull trout transplanted into Valley Creek in 1998.

Species	Number	Size (mm)	Source	Release Date
Westslope cutthroat trout	203	255 - 357	Middle Fork Salmon River (Dagger Falls)	6/9-7/2
Westslope cutthroat trout	42	127 - 255	Morse Creek (Pahsimeroi Tributary)	6/18
Westslope cutthroat trout	173	75 - 204	Grouse Creek (Loon Creek Tributary)	10/14
Westslope cutthroat trout	4	75 - 204	West Fork Mayfield Creek (Loon Creek Tributary)	10/14
Total Westslope cutthroat trout	422			
Bull trout	19	127 - 255	Morse Creek (Pahsimeroi Tributary)	6/18
Bull trout	317	75 - 306	West Fork Mayfield Creek (Loon Creek Tributary)	10/14-15
Total Bull trout	336			

Radio tracking revealed that tagged westslope cutthroat trout almost immediately move downstream in Valley Creek (Figure 1). On July 14 we located 14 tagged fish. Of these, the fish closest to the release site were 2.4 km downstream. The farthest were near Basin Creek in the Salmon River, 33.8 km downstream of the release site (Figure 2). On July 29 we located only five tagged fish, three of which were in the Salmon River. The farthest fish was 48.3 km downstream of the release site (Figure 3).

If funding is available, we hope to implant transmiters into westslope cutthroat trout from several other sources to determine if any one stock is more likely to remain in Valley Creek than the fish from the Middle Fork Salmon River. Donor streams we are particularly interested in are Morse, Big Morgan and Little Morgan creeks (Pahsimeroi River tributaries).

Upper Lemhi River

Table 3 lists redd counts since 1994. In 1998 there was a substantial increase in counts at all sites. These increases probably had several causes: (1) fishing regulations on the Lemhi River changed from no size limit to a 14-in minimum size restriction, (2) we completed several habitat improvement projects, and (3) Lemhi county experienced a reprieve in the drought conditions of the late 1980s and early 1990s. Regional personnel will continue to monitor these population trends.

Table 3. Numbers of resident rainbow trout redds counted in Big Springs Creek and Lemhi River, 1994 through 1999.

Survey Date	Lemhi River[a] Beyeler Ranch	Big Springs Creek[b] Neibauer Ranch	Big Springs Creek[c] Tyler Ranch	Total
4/26/94	-	-	-	40[d]
5/3/95	-	57	-	57
5/3/96	7	32	-	39
4/21-5/3/97	8	44	45	97
5/3/98	18	93	124	235
4/29/99	29	39	71	139

[a] Model Watershed habitat improvement project implemented Spring 1995.
[b] Model Watershed habitat improvement project implemented Summer 1996.
[c] Model Watershed habitat improvement project implemented Spring 1998.
[d] Incidental count taken during habitat survey; includes all of Big Spring Creek.

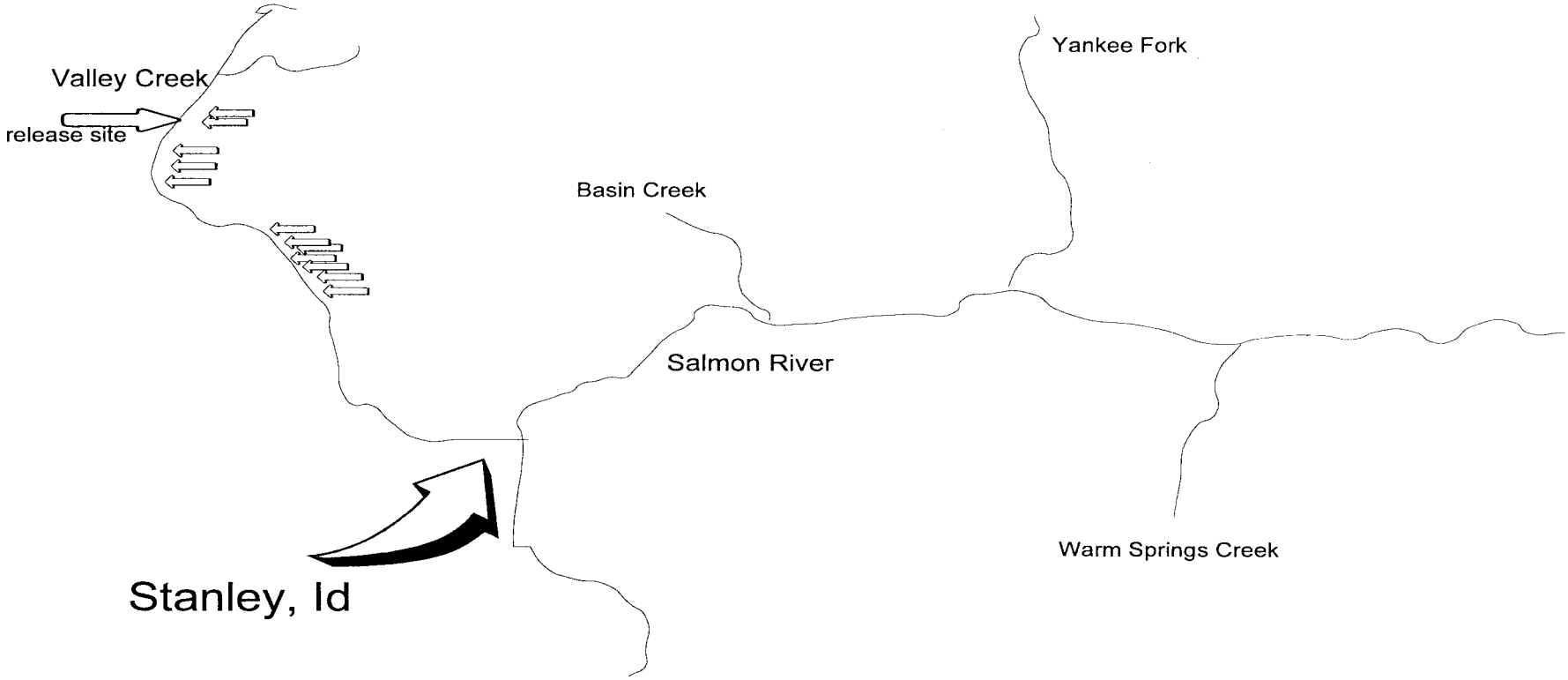

Figure 1. Locations of tagged cutthrout trout in Valley Creek, July 1, 1998.

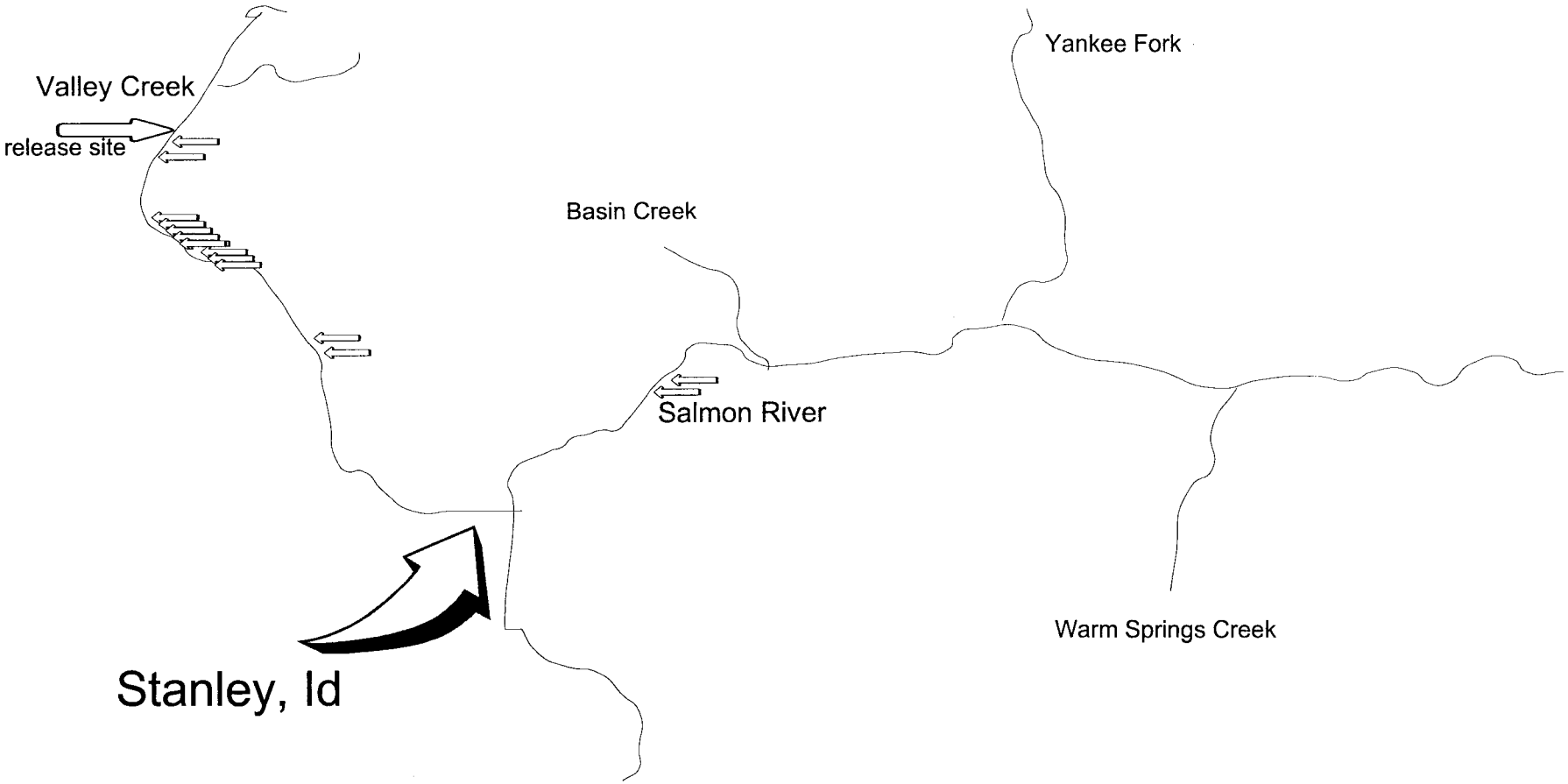

Figure 2. Locations of tagged cutthrout trout in Valley Creek, July 15, 1998.

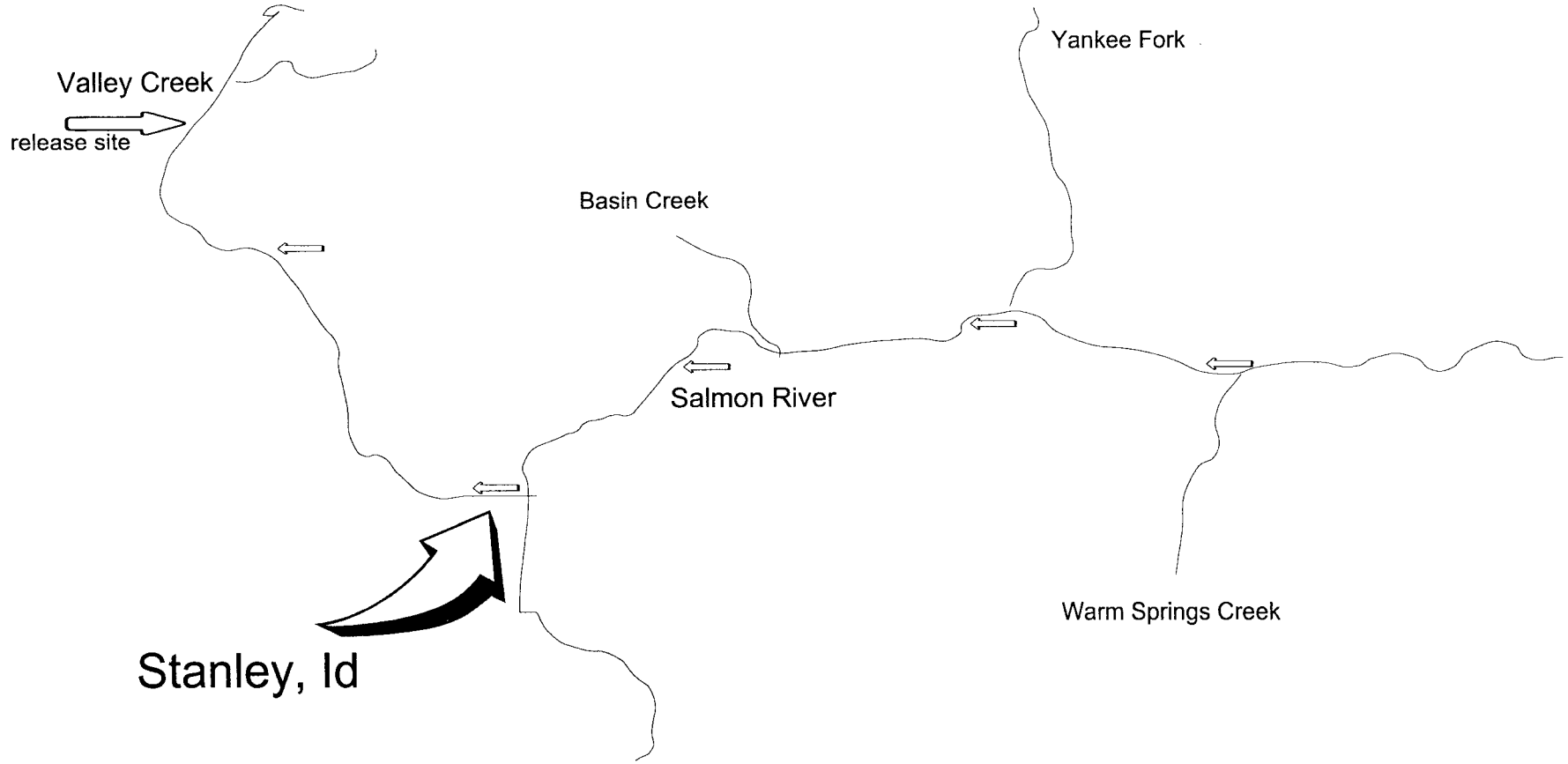

Figure 3. Locations of tagged cutthrout trout in Valley Creek, July 29, 1998.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fishery Management F-71-R-23

Project I: Surveys and Inventories

Subproject I-H: Salmon Region

Job: d

Title: Salmon and Steelhead Investigations

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

We conducted annual salmon redd counts in the Marsh Creek drainage, Valley Creek, Salmon River, Lemhi River, East Fork Salmon River, Pahsimeroi River, and the Yankee Fork Salmon River. The data will be included in the statewide annual Salmon Spawning Ground Surveys report.

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1998 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fishery Management F-71-R-23

Project II: Technical Guidance Subproject II-H: Salmon Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

During 1998, project staff provided technical assistance to all state and federal agencies upon request. We submitted comments to many agencies and private entities concerning stream alterations, bank stabilization, mining operations, reclamation plans, fish rearing proposals, private ponds, water right applications, grazing allotments, timber sales, highway reconstruction, habitat improvement, bridge construction, and hydropower projects. We made on-site inspections of proposed, on-going, and completed projects.

Fisheries staff also attended angler informational meetings; made school presentations, met with multi-agency collaborative groups, and developed the Salmon Region portion of the 1-800-ASK-FISH program. We responded to the general public in person, by telephone, and by mail to inquiries about fishing opportunities, techniques, regulations, and area specifics.

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OBJECTIVES

1. Assist the Idaho Department of Water Resources, the Idaho Department of Lands, the U.S. Army Corps of Engineers, and other state, federal, local, and private entities in evaluating the effects of habitat changes on fisheries.

2. Recommend procedures that minimize adverse effects of stream course alterations on aquatic habitat and fish.

3. Provide information on all aspects of fisheries and aquatic habitat as requested.

METHODS

We responded via letters, E-mail, field inspections, meetings and in writing to all requests for data, expertise, and recommendations from individuals, government agencies, and corporations. Project personnel attended meetings, conducted field inspections, and responded as appropriate.

RESULTS

During 1998, we responded to requests for technical assistance or comments on various water and fishery-related matters as follows:

Agency	Number of Requests
Idaho Outfitters & Guides Licensing Board	4
USDA Forest Service	13
Idaho Department of Water Resources	42
US Department of Transportation	6
Private and Miscellaneous	13
US Army Corps of Engineers	25
Custer/Lemhi County Commissioners	3
Shoshone-Bannock Tribe	5
Lemhi County Building Official	4
Division of Environmental Quality	1
US Bureau of Land Management	9
US Fish & Wildlife Service	4
National Marine Fisheries Service	11
Public meetings and presentations	4
Bureau of Reclamation	3
Private fish pond owners	12
Cities of Salmon and Challis	6

Most of our contacts with other agencies were made by telephone. We usually responded to stream alteration proposals by meeting with the applicant on-site, determining the nature of the situation, and sending written comments to the appropriate agency. Because the Salmon Region is so remote, we were often the only agency representatives available to conduct on-site inspections.

Fishery biologists responded to many inquiries from the public (by telephone, letter, and in person) about when, where, and how to participate in the region's fisheries, ranging from steelhead angling to alpine lake fishing.

During the steelhead fishing season we reported weekly steelhead fishing results on the local radio station and in area newspapers.

Local agencies, private citizens and county representatives formed collaborative groups in the Stanley Basin and the East Fork Salmon River watersheds to work together to 'guide' natural resource management. The groups believe a 'grass roots' approach with 'on the ground' leadership is the best way to manage local resources.

We helped obtain grants of $100,000 from Bonneville Power Administration and $20,000 from the USDA Forest Service to begin restoration work on a 12 mile reach of the Salmon River near Challis, Idaho. River restoration projects on the Lemhi, East Fork, and Pahsimeroi Rivers have taken up approximately 90 days of personnel time over the past year.

Because the Salmon Region has no full-time Information and Education or Regional Conservation Education personnel, project staff respond to numerous requests by local schools for fish and wildlife related presentations. During 1998, we made 30 presentations to approximately 375 students in five different schools.

RECOMMENDATIONS

1. Continue to provide technical guidance on issues involving fishery resources to help maintain fishery resources in the region.

2. Hire additional staff in the Salmon Region office to administer habitat issues and information and education needs.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fishery Management F-71-R-23

Project III: Habitat Management Subproject III-H: Salmon Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Project staff coordinated with the City of Challis to secure funding to build Blue Mountain Pond, an urban fishing pond in Challis, Idaho. We obtained funding for habitat restoration of 7.4 km of the Salmon River near Challis, and continued to work on habitat improvement projects on the Lemhi River. Landowners and agency personnel formed the East Fork Salmon River Watershed Group to develop a holistic management plan for that watershed.

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HABITAT MANAGEMENT SUMMARY

During 1998 we secured funding through the Sport Fish Restoration Program to construct an urban fishing pond. This program provided $60,000 of in-kind matching funds for actual pond construction as well as for the purchase and installation of water control structures. The 0.4 ha pond, located within the city limits of Challis, Idaho is situated on 1.5 ha of donated ground. Officially named the Blue Mountain Meadow Pond, this site will provide urban angling and educational opportunities for youth and for elderly and disabled people.

The City of Challis and the Idaho Department of Fish and Game entered into an agreement for care of the pond. The City will be responsible for ground maintenance as well as improvements of the pond and its facilities. The Department will be responsible for monthly fish stocking.

We also obtained $100,000 from the Bonneville Power Administration and $20,000 USDA Forest Service for habitat restoration of a 7.4 km reach of the Salmon River near Challis. Project staff and three landowners developed plans and submitted permits for work to begin in the spring of 1999. The US Army Corps of Engineers developed a preliminary work plan for this 7.4 km river section.

Fisheries staff continued to work with the Idaho Department of Fish and Game's Anadromous Fish Screen Program and the Lemhi County Model Watershed Program on habitat restoration projects. Staff assisted with stream surveys in the Stanley Basin to evaluate the potential of reconnecting blocked tributaries to the upper Salmon River. Reconnections would require improving irrigation efficiency and removing migration barriers.

We assisted in construction of approximately 3.1 km of fence and stabilized several eroding stream banks with rock barbs and willow plantings. We developed a proposal with the landowner to reconnect Canyon Creek to the Lemhi River. We are developing final cost estimates now and project implementation could occur in 1999.

Landowners and agency personnel formed a collaborative group called the East Fork Salmon River Watershed Group to attempt a holistic approach for management of the watershed. The group is pursuing grant monies to hire a facilitator/recorder, for mapping, and for administrative costs to develop an action plan for the basin.

1998 ANNUAL PERFORMANCE REPORT

State Of: Idaho

Program: Fisheries Management F-71-R-23

Project IV: Population Management

Subproject IV-H: Salmon Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

During summer 1998, the Idaho Department of Fish and Game stocked 76 mountain lakes in the Salmon Region. We stocked 61,550 fry in Salmon and Challis National Forest lakes: 2,000 arctic grayling *Thymallus arcticus*, and 59,550 westslope cutthroat trout *Oncorhynchus clarki lewisi*. The Department used a Cessna-185 fixed-wing aircraft at a cost of $26.04 per lake.

Project personnel removed brook trout *Salvelinus fontinalis* by gill netting and detonation cord from Carlson Lake on May 22 and 23, 1998 to reduce stunting in the remaining fish. We gill netted 818 brook trout during 483.3 diel net hours (1.62 fish/h). Detonation cord removed an additional 460 brook trout from Carlson Lake.

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INTRODUCTION

Carlson Lake

Carlson Lake is a popular fishing lake accessible by a non-maintained road located in T11N, R23E, S17 at approximately 2,438 m elevation. It drains into Double Spring Creek, a tributary of the Pahsimeroi River. The lake has one inlet and outlet that flow during summer months in high water years (Liter and Lukens 1994). Brook trout *Salvelinus fontinalis* is the only game species present in the lake.

Historically, Carlson Lake produced 0.9 to 1.4 kg brook trout, but by 1975 anglers were concerned about the decline in numbers of these large fish (Kent Ball, intradepartmental memos 1975). Gillnetting surveys show that average size of brook trout in Carlson Lake ranged from 192 mm to 209 mm between 1992-1998 (Table 1).

OBJECTIVES

Mountain Lakes

1. Maintain a viable high mountain lake fishery in the Salmon Region.

Carlson Lake

2. Reduce the number of brook trout to allow remaining fish to grow larger, enhancing angler interest in the fishery.

3. Obtain information on the current size and age structure of brook trout in Carlson Lake and document changes in size structure over time.

METHODS

Mountain Lakes

The Department contracted for a Cessna-185 fixed-wing aircraft to stock 67 Salmon Region high mountain lakes. Volunteers stocked nine lakes in the Stanley area.

Table 1. Carlson Lake brook trout length frequencies, 1992-98.

	1992	1996	1997	1998
Date	7/29	6/13	5/27-28	5/22-23
Sample size	71	103	999	1278
Size Range (mm)	150-312	164-310	118-240	120-292
Mean Total Length (mm)	209	217	192	196

Carlson Lake

On May 22 and 23, 1998 project personnel used thirteen 1.8 m X 38.1 m variable mesh gill nets to catch and remove brook trout from Carlson Lake. We set the nets with a rubber raft, spacing them evenly around the lake, perpendicular to the shore with the smallest mesh size towards shore. The three gill net sets ranged from 11.5 hours to 15.5 hours. The first and third sets were night sets while the second set was a daylight set.

We measured total lengths from 180 (22%) of the brook trout captured.

Biologists detonated about 600 m of 25-grain primer cord in the heavily vegetated littoral area surrounding Carlson Lake. We submerged two rows of primer cord parallel to shore and approximately 3.6 and 7.3 m from shore.

RESULTS

Mountain Lakes

The Idaho Department of Fish and Game stocked 61,550 fry in the Salmon/Challis National Forest in August 1998. We stocked 2,000 arctic grayling *Thymallus arcticus*, and 59,550 westslope cutthroat trout *Oncorhynchus clarki lewisi.* Golden trout *O. aguabonita* were requested but not available.

Areas stocked included the Lemhi Mountain Range/Hat Creek Lakes (Table 2), Bighorn Crags (Table 3), and Continental Divide (Table 4). Volunteers stocked nine lakes in the Stanley area (Table 5).

Table 2. Lemhi Mountain Range/Hat Creek Lakes mountain lake fry plants, 1998.

Lake Name	Catalog No.	Species*	Number Stocked
Middle Fork Little Timber Lake	071271	C2	1,000
Devils Lake	071263	C2	1,000
Big Eightmile Lake	071030	C2	500
Dairy Lake	071263	C2	500
Everson Lake	071257	C2	1,500
Patterson Creek Lake #2	071259	C2	250
Mill Creek Reservoir #1	071254	C2	1,500
Bray Lake	071247	C2	500
West Fork Hayden Creek Lake #2	071249	C2	250
Wright Lake	071246	C2	250
Buck Lake #3	071240	C2	250
Bear Valley Lake #1	071243	C2	1,500
Bear Valley Lake #2	071244	C2	1,000
Bear Valley Lake #3	071245	C2	250
McNutt Lake	071236	C2	500
Basin Creek Lake #5	071237	C2	1,000
North Fork Hat Creek Lake	071285	C2	250
Middle Fork Hat Creek Lake #2	071288	GR	500
Middle Fork Hat Creek Lake #3	071289	C2	1,000
Middle Fork Hat Creek Lake #4	071290	C2	500
Middle Fork Hat Creek Lake #5	071293	C2	1,000
South Fork Moyer Creek Lake	071205	GR	500

* C2 = westslope cutthroat trout, GR = arctic grayling.

Table 3. Bighorn Crags mountain lake fry plants, 1998.

Lake Name	Catalog No.	Species*	Number Stocked
Iron Lake #1	071279	C2	1,000
Pothole Lake	071184	C2	500
Gentian Lake	071195	C2	500
Birdbill Lake	071197	C2	500
Sheepeater Lake (Ship Island Lake #7)	070620	C2	1,000
Shoban Lake (Ship Island Lake #6)	070619	C2	1,000
Airplane Lake (Ship Island Lake #5)	070618	C2	1,000
Ship Island Lake #4	070616	GR	500
Ship Island Lake #2	070613	C2	1,000
Harbor Lake	070796	C2	3,000
Wilson Lake	070794	C2	1,000
Heart Lake	070793	C2	2,000
Welcome Lake	070790	C2	3,000
Terrace Lake #4	070629	C2	500
Terrace Lake #3	070628	C2	500
Terrace Lake #2	070627	C2	500
Terrace Lake #1	070626	C2	1,000
Skyhigh Lake (Puddin Mountain Lake #15)	070787	C2	1,000
Lost Lake	070740	C2	1,000
Turquoise Lake (Puddin Mountain Lake #10)	070778	C2	1,000
Echo Lake (Puddin Mountain Lake #9)	070777	C2	1,000
Reflection Lake Puddin Mountain Lake #5)	070770	C2	1,000
Twin Cove Lake (Puddin Mountain Lake #6)	070773	C2	1,000
Doe Lake (Puddin Mountain Lake #2)	070766	C2	500
Buck Lake (Puddin Mountain Lake #1)	070764	C2	500
Ramshorn Lake	070755	C2	1,000
Paragon Lake	070756	C2	1,000
Plateau Lake	070632	C2	500
South Fork Lake	070630	C2	500
Golden Trout Lake	071201	C2	1,500
Yellow Jacket Lake #2	070805	C2	500
Yellow Jacket Lake #1	070803	C2	500
White Goat Lake	070839	C2	500

* C2 = westslope cutthroat trout, GR = arctic grayling.

Table 4. Continental Divide mountain lake fry plants, 1998.

Lake Name	Catalog No.	Species*	Number Stocked
Bronco Lake	070566	C2	1,000
Hidden Lake	070616	C2	2,000
Lost Packer Lake	070564	C2	1,000
Helen Lake	071573	C2	1,000
North Fork East Fork Reynolds Lake #2	070575	C2	1,000
North Fork East Fork Reynolds Lake #4	070578	C2	1,000
Line Lake	070603	C2	500
Geertson Lake (Starr Lake)	071225	C2	1,000
Geertson Lake (Starr Lake)	071225	GR	500
Bohannon Lake	071228	C2	500
U.P. Lake	071220	C2	1,000
Pony Lake	071204	C2	500

* C2 = westslope cutthroat trout, GR = arctic grayling.

Table 5. Stanley vicinity mountain lake fry plants stocked by volunteers, 1998.

Lake Name	Catalog No.	Species*	Number Stocked
Valley Creek Lake #1	071585	C2	250
Valley Creek Lake #2	071587	C2	250
Elk Lake	071163	C2	250
F-82 Lake	071124	C2	500
Hidden Lake	071573	C2	300
Martha Lake	071569	C2	250
Thunder Lake	071679	C2	250
Phyllis Lake	071683	C2	1,000
Alpine Lake	071540	C2	500

* C2 = westslope cutthroat trout.

Carlson Lake

Project personnel removed 818 brook trout Carlson Lake in 483.3 net hours in May 1998. Sizes ranged from 120 mm to 292 mm with an average size of 196.4 mm (Table 1). Catch rates per set ranged from 0.95 to 2.23 fish/h. Length frequency histograms reveal normally distributed length frequency curves for years in which gillnetting surveys were performed (Figure 1)

We sampled Carlson Lake in 1997 with similar results. Gill nets captured 999 brook trout in 466 net hours. Catch rates varied from 0.85-3.1 fish/h. The size range in 1997 was 118 to 240 mm with a mean length of 192 mm. We also collected otoliths in 1997, but could not read them because of uneven breakage and extremely tight banding of the annuli.

Staff recovered 460 brook trout after detonating the primer cord. This is a low estimate of the actual number killed, as we could not see carcasses in water deeper than 6 m. Additional fish may have died after workers left the lake.

DISCUSSION

Mountain Lakes

The Department gives a low priority to mountain lake management. We continue to stock mountain lakes, but with few surveys and little research to determine the effects of stocking.

We recommend that the Department revise its goals and strategies for management of mountain lakes. Our goals should include: (1) identification of lakes capable of natural recruitment, (2) consideration of effects of stocking on downstream populations of indigenous trouts, (3) consideration of ecological effects of stocking on lake ecosystems, amphibians, and indigenous aquatic invertebrate populations, and (4) establishment of statewide, standardized survey methods and stocking criteria.

Carlson Lake

The Department has had mixed success introducing predators into high mountain lakes to change the size structure of brook trout populations (Janssen and Patterson 1993). In 1993, the Department stocked 702 Gerrard strain rainbow trout *Oncorhynchus mykiss* (average total length 254 mm) in Carlson Lake (Liter and Lukens 1996). This introduction apparently failed, as rainbow trout are no longer present in the lake and the brook trout population is still stunted.

The Idaho Fish and Game Commission recently increased the brook trout bag limit to

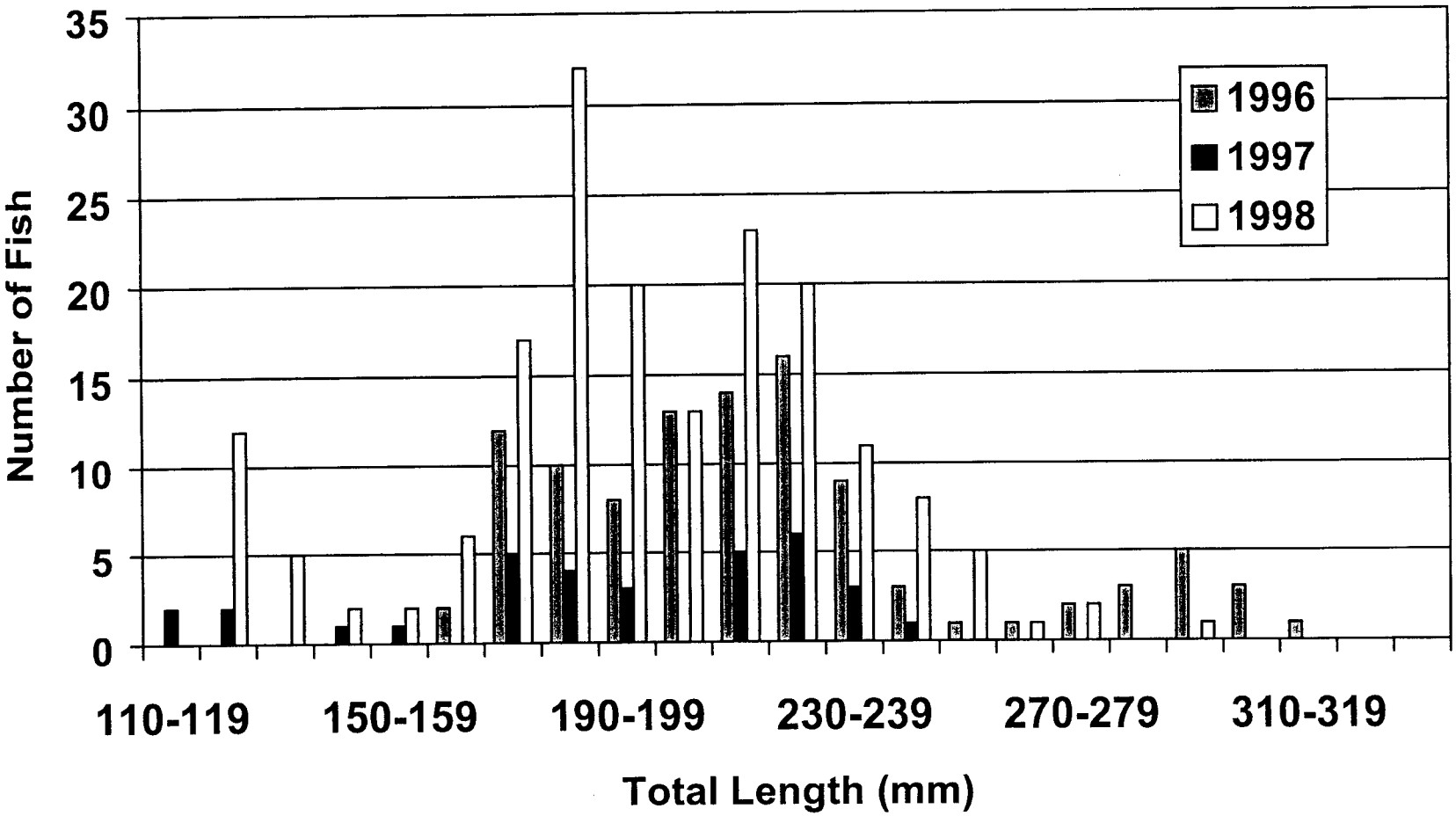

Figure 1. Length frequency of brook trout taken from Carlson Lake, 1996-98.

16 fish. This may help increase the average size fish. Our management at Carlson Lake will be to continue gillnetting efforts, maintain a high bag limit, and improve angler access. If these efforts fail to improve size structure we may consider chemical renovation.

RECOMMENDATIONS

Mountain Lakes

1. Identify lakes capable of natural recruitment.

2. Consider effects of stocking on downstream populations of indigenous trout.

3. Consider effects of stocking on lake ecosystems, amphibians, and indigenous aquatic invertebrate populations.

4. Establish statewide, standardized survey methods and stocking criteria.

Carlson Lake

1. Continue gill netting efforts and consider chemical eradication to increase the average size of brook trout remaining in Carlson Lake.

2. Increase angler pressure by improving road access.

3. Continue the increased bag limit (16) on brook trout in Carlson Lake.

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